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Experimental study of an advanced concept of moderate-resolution holographic spectrographs

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Abstract

© 2018. The Astronomical Society of the Pacific. All rights reserved. Printed in the U.S.A. We present the results of an experimental study of an advanced moderate-resolution spectrograph based on a cascade of narrow-band holographic gratings. The main goal of the project is to achieve a moderately high spectral resolution with R up to5000 simultaneously in the 4300–6800 Å visible spectral range on a single standard CCD, together with an increased throughput. The experimental study consisted of (1) resolution and image quality tests performed using the solar spectrum, and (2) a total throughput test performed for a number of wavelengths using a calibrated lab monochromator. The measured spectral resolving power reaches values over R>4000 while the experimental throughput is as high as 55%, which agrees well with the modeling results. Comparing the obtained characteristics of the spectrograph under consideration with the best existing spectrographs, we conclude that the used concept can be considered as a very competitive and cheap alternative to the existing spectrographs of the given class. We propose several astrophysical applications for the instrument and discuss the prospect of creating its full-scale version.

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Keywords

Instrumentation: spectrographs, Techniques: spectroscopic

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